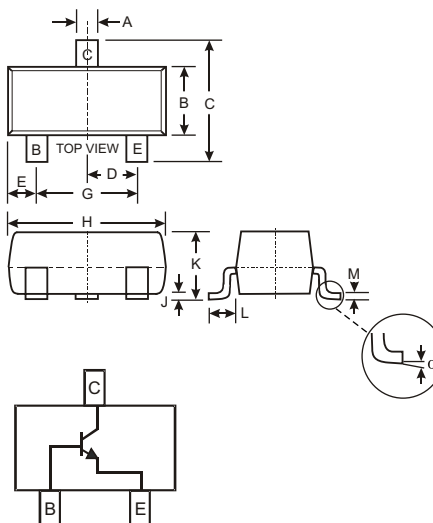


### Features

- Ideally Suited for Automatic Insertion
- Complementary PNP Types Available (BC856-BC858)
- For Switching and AF Amplifier Applications
- Also Available in Lead Free Version

### Mechanical Data

- Case: SOT-23, Molded Plastic
- Case material - UL Flammability Rating Classification 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Also Available in Lead Free Plating (Matte Tin Finish). Please see Ordering Information, Note 5, on Page 3
- Pin Connections: See Diagram
- Marking Codes (See Table Below & Diagram on Page 3)
- Ordering & Date Code Information: See Page 3
- Approx. Weight: 0.008 grams



| SOT-23               |       |       |
|----------------------|-------|-------|
| Dim                  | Min   | Max   |
| A                    | 0.37  | 0.51  |
| B                    | 1.20  | 1.40  |
| C                    | 2.30  | 2.50  |
| D                    | 0.89  | 1.03  |
| E                    | 0.45  | 0.60  |
| G                    | 1.78  | 2.05  |
| H                    | 2.80  | 3.00  |
| J                    | 0.013 | 0.10  |
| K                    | 0.903 | 1.10  |
| L                    | 0.45  | 0.61  |
| M                    | 0.085 | 0.180 |
| α                    | 0°    | 8°    |
| All Dimensions in mm |       |       |

| Marking Code (Note 2) |              |        |                   |
|-----------------------|--------------|--------|-------------------|
| Type                  | Marking      | Type   | Marking           |
| BC846A                | 1A, K1Q      | BC847C | 1G, K1M           |
| BC846B                | 1B, K1R      | BC848A | 1J, K1J, K1E, K1Q |
| BC847A                | 1E, K1E, K1Q | BC848B | 1K, K1K, K1F, K1R |
| BC847B                | 1F, K1F, K1R | BC848C | 1L, K1L, K1M      |

### Maximum Ratings @ T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                                       | Symbol                            | Value          | Unit |
|------------------------------------------------------|-----------------------------------|----------------|------|
| Collector-Base Voltage                               | BC846<br>BC847<br>BC848           | 80<br>50<br>30 | V    |
| Collector-Emitter Voltage                            | BC846<br>BC847<br>BC848           | 65<br>45<br>30 | V    |
| Emitter-Base Voltage                                 | BC846, BC847<br>BC848             | 6.0<br>5.0     | V    |
| Collector Current                                    | I <sub>C</sub>                    | 100            | mA   |
| Peak Collector Current                               | I <sub>CM</sub>                   | 200            | mA   |
| Peak Emitter Current                                 | I <sub>EM</sub>                   | 200            | mA   |
| Power Dissipation (Note 1)                           | P <sub>d</sub>                    | 300            | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 1) | R <sub>θJA</sub>                  | 417            | °C/W |
| Operating and Storage Temperature Range              | T <sub>j</sub> , T <sub>STG</sub> | -65 to +150    | °C   |

- Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. Current gain subgroup "C" is not available for BC846.

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                                |                                         | Symbol                                                        | Min                   | Typ                   | Max                         | Unit                                            | Test Condition                                                                                                                                        |
|-----------------------------------------------|-----------------------------------------|---------------------------------------------------------------|-----------------------|-----------------------|-----------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage (Note 3)     | BC846<br>BC847<br>BC848                 | $V_{(BR)CBO}$                                                 | 80<br>50<br>30        | —<br>—<br>—           | —<br>—<br>—                 | V                                               | $I_C = 10\mu\text{A}$ , $I_B = 0$                                                                                                                     |
| Collector-Emitter Breakdown Voltage (Note 3)  | BC846<br>BC847<br>BC848                 | $V_{(BR)CEO}$                                                 | 65<br>45<br>30        | —<br>—<br>—           | —<br>—<br>—                 | V                                               | $I_C = 10\text{mA}$ , $I_B = 0$                                                                                                                       |
| Emitter-Base Breakdown Voltage (Note 3)       | BC846, BC847<br>BC848                   | $V_{(BR)EBO}$                                                 | 6<br>5                | —                     | —                           | V                                               | $I_E = 1\mu\text{A}$ , $I_C = 0$                                                                                                                      |
| H-Parameters                                  |                                         |                                                               |                       |                       |                             |                                                 |                                                                                                                                                       |
| Small Signal Current Gain                     | Current Gain Group A<br>B<br>C          | $h_{fe}$                                                      | —<br>—<br>—           | 220<br>330<br>600     | —<br>—<br>—                 | —<br>—<br>—                                     | $V_{CE} = 5.0\text{V}$ , $I_C = 2.0\text{mA}$ ,<br>$f = 1.0\text{kHz}$                                                                                |
| Input Impedance                               | Current Gain Group A<br>B<br>C          | $h_{ie}$                                                      | —<br>—<br>—           | 2.7<br>4.5<br>8.7     | —<br>—<br>—                 | $k\Omega$<br>$k\Omega$<br>$k\Omega$             |                                                                                                                                                       |
| Output Admittance                             | Current Gain Group A<br>B<br>C          | $h_{oe}$                                                      | —<br>—<br>—           | 18<br>30<br>60        | —<br>—<br>—                 | $\mu\text{S}$<br>$\mu\text{S}$<br>$\mu\text{S}$ |                                                                                                                                                       |
| Reverse Voltage Transfer Ratio                | A                                       | $h_{re}$                                                      | —                     | $1.5 \times 10^{-4}$  | —                           | —                                               |                                                                                                                                                       |
| Current Gain Group                            | B                                       | $h_{re}$                                                      | —                     | $2 \times 10^{-4}$    | —                           | —                                               |                                                                                                                                                       |
|                                               | C                                       | $h_{re}$                                                      | —                     | $3 \times 10^{-4}$    | —                           | —                                               |                                                                                                                                                       |
| DC Current Gain                               | Current Gain Group A<br>B<br>(Note 3) C | $h_{FE}$                                                      | 110<br>200<br>420     | 180<br>290<br>520     | 220<br>450<br>800           | —                                               | $V_{CE} = 5.0\text{V}$ , $I_C = 2.0\text{mA}$                                                                                                         |
| Collector-Emitter Saturation Voltage (Note 3) |                                         | $V_{CE(SAT)}$                                                 | —                     | 90<br>200             | 250<br>600                  | mV                                              | $I_C = 10\text{mA}$ , $I_B = 0.5\text{mA}$<br>$I_C = 100\text{mA}$ , $I_B = 5.0\text{mA}$                                                             |
| Base-Emitter Saturation Voltage (Note 3)      |                                         | $V_{BE(SAT)}$                                                 | —                     | 700<br>900            | —                           | mV                                              | $I_C = 10\text{mA}$ , $I_B = 0.5\text{mA}$<br>$I_C = 100\text{mA}$ , $I_B = 5.0\text{mA}$                                                             |
| Base-Emitter Voltage (Note 3)                 |                                         | $V_{BE(ON)}$                                                  | 580<br>—              | 660<br>—              | 700<br>770                  | mV                                              | $V_{CE} = 5.0\text{V}$ , $I_C = 2.0\text{mA}$<br>$V_{CE} = 5.0\text{V}$ , $I_C = 10\text{mA}$                                                         |
| Collector-Cutoff Current (Note 3)             | BC846<br>BC847<br>BC848                 | $I_{CES}$<br>$I_{CES}$<br>$I_{CES}$<br>$I_{CBO}$<br>$I_{CBO}$ | —<br>—<br>—<br>—<br>— | —<br>—<br>—<br>—<br>— | 15<br>15<br>15<br>15<br>5.0 | nA<br>nA<br>nA<br>nA<br>$\mu\text{A}$           | $V_{CE} = 80\text{V}$<br>$V_{CE} = 50\text{V}$<br>$V_{CE} = 30\text{V}$<br>$V_{CB} = 40\text{V}$<br>$V_{CB} = 30\text{V}$ , $T_A = 150^\circ\text{C}$ |
| Gain Bandwidth Product                        |                                         | $f_T$                                                         | 100                   | 300                   | —                           | MHz                                             | $V_{CE} = 5.0\text{V}$ , $I_C = 10\text{mA}$ ,<br>$f = 100\text{MHz}$                                                                                 |
| Collector-Base Capacitance                    |                                         | $C_{CBO}$                                                     | —                     | 3.0                   | —                           | pF                                              | $V_{CB} = 10\text{V}$ , $f = 1.0\text{MHz}$                                                                                                           |
| Noise Figure                                  |                                         | NF                                                            | —                     | 2                     | 10                          | dB                                              | $V_{CE} = 5\text{V}$ , $I_C = 200\mu\text{A}$ ,<br>$R_S = 2.0k\Omega$ ,<br>$f = 1.0\text{kHz}$ , $\Delta f = 200\text{Hz}$                            |

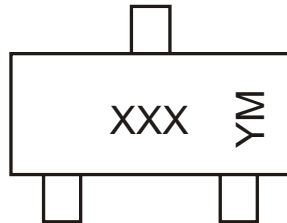
Notes: 3. Short duration pulse test used to minimize self-heating effect.

## Ordering Information (Note 4)

| Device    | Packaging | Shipping         |
|-----------|-----------|------------------|
| BC84xx-7* | SOT-23    | 3000/Tape & Reel |

- Notes:
- For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.
  - \* xx = device type, e.g. BC846A-7.
  - For Lead Free version (with Lead Free terminal finish) part number, please add "-F" suffix to part number above.  
Example: BC846A-7-F.

## Marking Information



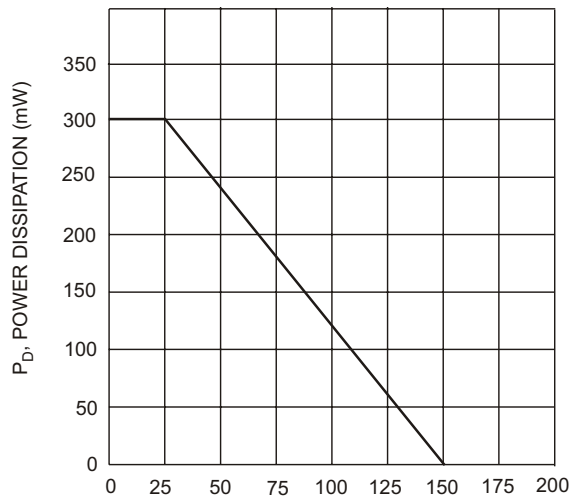
XXX = Product Type Marking Code (See Page 1), e.g. K1Q or 1A = BC846A  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

### Date Code Key

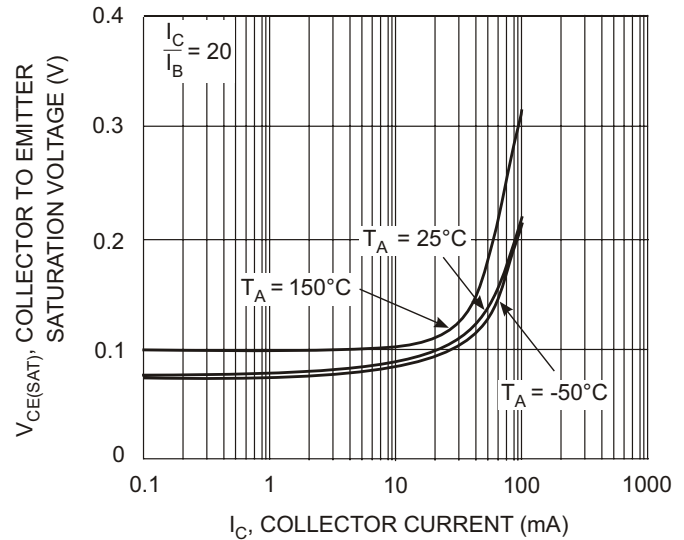
| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | J    | K    | L    | M    | N    | P    | R    | S    | T    | U    | V    | W    |

| Month | Jan | Feb | March | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3     | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |



$T_A$ , AMBIENT TEMPERATURE (°C)  
 Fig. 1, Max Power Dissipation vs  
 Ambient Temperature



$I_C$ , COLLECTOR CURRENT (mA)  
 Fig. 2 Collector Emitter Saturation Voltage  
 vs. Collector Current

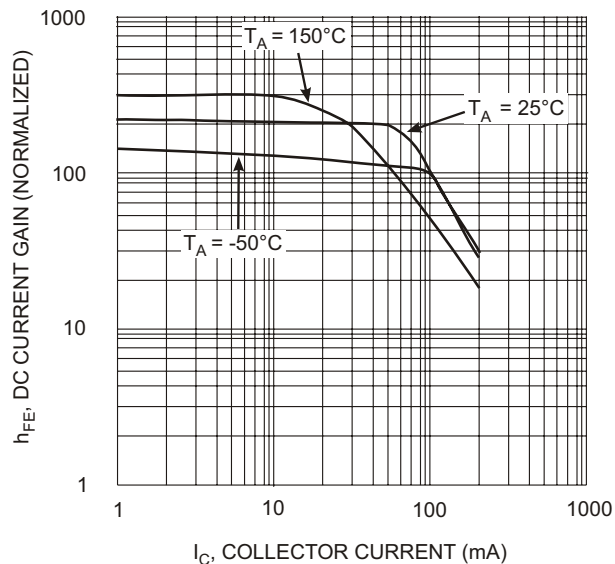


Fig. 3, DC Current Gain vs. Collector Current

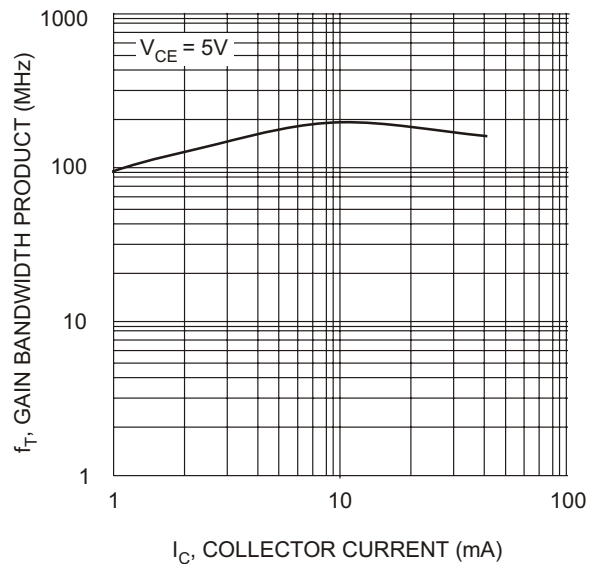


Fig. 4, Gain Bandwidth Product vs Collector Current